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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/544,992	04/06/2000	Brian Mitchell Bass	RAL9-1999-0140-US1	9200

7590

07/08/2002

Josceyln G. Cockburn
IBM CORPORATION
972/B656 P O Box 12195
Research Triangle Park, NC 27709

EXAMINER

LY, ANH

ART UNIT

PAPER NUMBER

2172

DATE MAILED: 07/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/544,992

Applicant(s)

BASS ET AL.

Examiner

Anh Ly

Art Unit

2172

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 35-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 and 35-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Applicant's election without traverse of claims 25-34 in Paper No. #6 is acknowledged.
2. Claims 1-24 and 35-46 are pending in this application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-24 and 35-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Routing on Longest-Matching Prefixes" of Willibald Doeringer, Gunter Karjoth and Mehdi Nassehi (hereinafter Doeringer) from 1996 IEEE (pp.86-97).

With respect to claim 1, Doeringer discloses reading an input key as a search string (p. 86); using the N most significant bits of the input key as an index into a table representing a plurality of root nodes of search trees wherein each non-empty entry contains a pointer to a next branch in the search tree or a leaf (p. 86-88); determining if the pointer in a non-empty table entry points to a leaf or a next branch of the corresponding search tree; reading the next branch contents if the pointer does not point to the leaf of the corresponding search tree and comparing the prefix represented by the next branch with the input key to find a distinguishing bit position; reading a leaf pattern when the leaf of a corresponding search tree is reached and comparing the leaf pattern with the input key to determine if the leaf pattern matches the input key; and returning the longest prefix match found for the input key to a requesting application (p. 87-89).

Doeringer does not clearly disclose "searching string and a table representing a plurality of root nodes of search trees." But, however, Doeringer shows a dynamic

database of binary keys of arbitrary length as input key for a search string and Patricia tries structures as table of nodes, dynamic routing tables and pointer reversal (p.86, abstract and introduction sections and p. 88). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the teachings of Doeringer such as Patricia tries, binary keys, matching prefix rules and keys, nodes and prefix branches so as to obtain a method for determining a longest prefix match for a variable length search key by a computer processing device in the prefix matching or pattern matching for information retrieval environment.

With respect to claim 2, Doeringer discloses wherein the table representing a plurality of root nodes of search trees contains 2ⁿ entries (p. 87-89: data structures and properties of DP-tries - Dynamic prefix tries).

With respect to claim 3, Doeringer discloses wherein the computer processing device is a network processor (p. 94, under conclusions section – a variety of networking functions, multiprotocol environment).

With respect to claims 4-13, Doeringer discloses wherein the contents of the next branch of the corresponding search tree points to another next branch; wherein the contents of the next branch points to the leaf of the corresponding search tree; wherein the contents of the next branch points to both a bird and to another next branch of the corresponding search tree; wherein the bird represents a special type of leaf that represents a partial prefix match of the input key; wherein the bird is placed on a bird stack along with an associated bit position; testing the bird stack to determine if it is full;

if the bird stack is not full, reading the contents of the next branch of the corresponding search tree; if the bird stack is full, flushing the bird stack; wherein the act of flushing the bird stack comprises the acts of reading the contents of the birds from a memory location; comparing the input key with the pattern stored in the contents of the bird memory location; determining a distinguishing position which represents a first bit at which the bird pattern and the input key differ; selecting the bird with the largest bit number that does not exceed the distinguishing position to keep in the bird stack; and removing all other birds in the bird stack and the act of terminating the search for the longest prefix match when the bit number of the next branch exceeds the length of the input key (pp 86-93).

With respect to claim 14, Doeringer discloses a pattern or key that is to be searched; a direct table that stores a first address location for a search tree; a plurality of pattern search control blocks that each represent a branch in the search tree; at least one bird representing a partial match of the input key; and a plurality of leaves wherein each leaf is an address location for the result of a search (pp 86-89).

Doeringer does not clearly disclose "a direct table that stores address location." But, however, Doeringer shows Patricia tries structures as table of nodes and pointer reversal and dynamic routing tables (p.86, abstract and introduction sections and p. 88). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the teachings of Doeringer such as Patricia tries, binary keys, matching prefix rules and keys, nodes and prefix branches so as to have a computer readable medium containing a plurality of data structures for finding a longest

prefix match for a variable length search key for determining a longest prefix match for a variable length search key by a computer processing device in the prefix matching or pattern matching for information retrieval environment.

With respect to claims 15-24, Doeringer discloses a lookup definition table that manages a tree search memory; wherein the lookup definition table comprises entries that define a physical memory that the tree resides in, a size of the key and leaf, and a type of search to be performed; wherein the lookup definition table is implemented in a plurality of memories; wherein a format for a direct table entry includes at least one of a search control block; a next pattern address that point to a next pattern search control block; a leaf control block address that points to a leaf or result; a next bit or bits to test; and a direct leaf; a format for a pattern search control block includes at least one of a search control block; a next pattern address that point to a next pattern search control block; a leaf control block address that points to a leaf or result; and a next bit or bits to test; a leaf data structure includes at least one of a leaf chaining pointer; a prefix length; a pattern to be compared to the search key; and variable user data; the direct leaf is stored directly in a direct table entry and includes a search control block and a pattern to be compared to a search key; a pattern search control block is inserted in the search tree at a position where the leaf patterns differ; a pattern search control block has a shape defined by a width of one and a height of one and is stored in a memory that has a line length of at least 64 bits and a pattern search control block has a shape defined by a width of one and a height of two and is stored in a memory of at least 36 bits (pp.87-93).

Claim 35 is essentially the same as claim 1 except that it is directed to a computer readable medium rather than a method (p. 86, p. 86-88 and p. 87-89), and is rejected for the same reason as applied to the claim 1 hereinabove.

Claim 36 is essentially the same as claim 2 except that it is directed to a computer readable medium rather than a method (p. 87-89: data structures and properties of DP-tries - Dynamic prefix tries), and is rejected for the same reason as applied to the claim 2 hereinabove.

Claims 37-46 are essentially the same as claims 4-13 except that it is directed to a computer readable medium rather than a method (pp 86-93), and is rejected for the same reason as applied to the claim 1 hereinabove.

Contact Information

6. Any inquiry concerning this communication should be directed to Anh Ly whose telephone number is (703) 306-4527. The examiner can be reached on Monday - Friday from 8:00 AM to 4:00 PM.

If attempts to reach the examiner are unsuccessful, see the examiner's supervisor, Kim Vu, can be reached on (703) 305-4393.

Any response to this action should be mailed to:

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or faxed to:

(703) 746-7238 (after Final Communication)

or:

(703) 746-7239 (for formal communications intended for entry)

or:

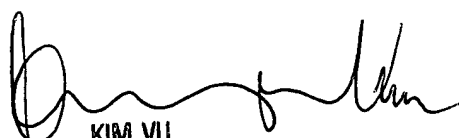
(703) 746-7240 (for informal or draft communications, or Customer Service

Center, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Fourth Floor (receptionist).

Inquiries of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

AL



KIM VU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Jun. 25th, 2002.